

REMARKS

This Amendment and Response is filed in reply to the Office action dated August 25, 2006. Claims 1, 5, 18-19, 25-26, 29, 31, 46-47, 51, 54 and 59 are amended herein. Claims 2, 4, 32-36, 39-45, 48 and 55-58 were previously canceled. Accordingly, after entry of this Amendment and Response, claims 1, 3, 5-31, 37-38, 46-47, 49-54 and 59-69 remain pending.

I. Claim Rejections Under 35 U.S.C. § 112

Claim 54 is rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. Specifically the claim recites the limitation of wireless communication medium which is not supported in the specification. In response, claim 54 is amended to delete reference to a network, wireline, or wireless communication medium.

Claim 51 is rejected under 35 U.S.C. § 112, second paragraph, for lack of proper antecedent basis for the limitation "the particular operations" in "the particular operations include memory access operations." In response, claim 51 has been amended to recite a limitation "the first operation ..." which has proper antecedent basis.

II. Claim Rejections Under 35 U.S.C. § 102

Claims 1, 3, 5-15, 19-31, 37-38, 46, 47, 49, 59-60 and 62 are rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,964,867 to Anderson et al. (hereinafter "Anderson"). An anticipation rejection requires that each and every limitation of a claim be disclosed in a single prior art reference.

Initially, the rejection of independent claims 1, 19, 46 and 59 is addressed. Independent claim 1 is amended to include the limitation "backtracking a displacement within an unambiguous skid region from a detection point in the code coinciding with the detection of the execution event to a preceding operation, wherein the displacement is based, at least in part, on a type of operation appropriate to have triggered the execution event." Independent claims 19 and 59 are amended to include a similar limitation. Support for these amendments can be found at least at paragraph 1023 of the application.

It is respectfully submitted that Anderson is insufficient to anticipate the amended independent claims 1, 19 and 59. Each claim requires backtracking a displacement within an unambiguous skid region from a detection point in the code coinciding with the detection of the execution event to a preceding operation. An unambiguous skid region is a sufficient detection interval (defined by a sequence of instructions) that allows association of an event detection with a corresponding target instruction without an intervening ambiguity-creating location such as a branch target location. Anderson does not teach such a limitation.

Anderson discloses attributing performance counter events, such as cache misses, to the instruction executing six cycles after the event by using static analysis to sometimes work backwards from the peak to identify the instruction causing the event (*see Anderson* column 3, lines 40-49). Anderson also discloses that merges in control flows can create ambiguities in identifying actual paths taken (*see Anderson* column 23, lines 54-55). Thus, Anderson teaches associating an event with a prior operation using a statistically based tool, static analysis and does not teach backtracking a displacement within an unambiguous skid region from a detection point in the code coinciding with the detection of the execution event as required by the independent claims.

Further, while Anderson discloses that event samples can be widely distributed over many instructions resulting in skewing and smearing of execution events (*see Anderson* column 3, lines 50-56), skewing and smearing of events over instruction samples does not disclose an unambiguous skid region. Skew generally refers to the difference between the instruction associated with the event detection and the instruction causing the event. Smear generally refers to the variability in skew caused by a processor issuing a variable number of instructions each cycle. Thus, while Anderson discloses why it can be difficult to associate an event with the operation that caused the event, it does not disclose backtracking a displacement within an unambiguous skid region from a detection point as required by the independent claims.

Independent claim 46 is amended to include the limitation "classifying the execution event as ambiguous or unambiguous." Anderson does not disclose such a limitation and therefore cannot anticipate independent claim 46.

Insofar as Anderson does not disclose all the limitations of the independent claims 1, 19, 46 and 59, it cannot anticipate them. Therefore, it is respectfully submitted that independent claims 1, 19, 46 and 59 are patentable over Anderson, believed to be in form for allowance, and such indication is respectfully requested. The remaining claims 3, 5-15, 20-31, 37-38, 47, 49, 60 and 62 all depend, either directly or indirectly, from one of independent claims 1, 19, 46 and 59. Accordingly, these dependent claims are themselves patentable over Anderson for at least the reasons set forth above and such indication is respectfully requested. This statement is made without reference to or waiving the independent bases of patentability within each dependent claim.

III. Claim Rejections Under 35 U.S.C. § 103

Claims 16-18 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Anderson in view of U.S. Patent Publication No. 2002/0010913 to Ronstrom (hereinafter "Ronstrom"). Claims 63-69 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Anderson in view of "Efficient Instruction Scheduling Using Finite State Automata,"

Proceedings of MICRO-28, Vasanth Bala and Norman Rubin (hereinafter "Bala"). Claims 50-54 and 61 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Ronstrom in view of Bala. These rejections are respectfully traversed. A proper prima facie obviousness rejection requires 1) a suggestion or motivation to modify the prior art reference or combine the reference teachings; 2) a reasonable expectation of success; and 3) that the combined references teach or suggest all of the claim limitations. See MPEP § 2143.

A. Rejection of Claims 16-18 Under 35 U.S.C. § 103

Claims 16-18 depend, either directly or indirectly, on independent claim 1. As previously discussed above, Anderson does not teach or suggest a limitation of backtracking a displacement within an unambiguous skid region from a detection point in the code coinciding with the detection of the execution event to a preceding operation, wherein the displacement is based, at least in part, on a type of operation appropriate to have triggered the execution event as required by the independent claim 1. Further, Ronstrom does not teach or suggest such a limitation. Rather, Ronstrom teaches a method and system employing a jump memory to store execution statistics to optimize execution of a submitted program (see *Ronstrom* paragraph [0059]).

Further, Ronstrom only discloses the use of a code scheduling execution unit for generating a dummy instruction code for lowering cache miss penalty (see *Ronstrom* paragraph 12). This has nothing to do with backtracking a displacement within an unambiguous skid region from a detection point. Therefore, it is respectfully submitted that claims 16-18 are patentable over Anderson in view of Ronstrom and such indication is respectfully requested.

B. Rejection of Claims 63-69 under 35 U.S.C. § 103

Claims 63-69 depend, either directly or indirectly, from independent claims 1, 19 and 46. As previously discussed above, Anderson does not teach or suggest a limitation of backtracking a displacement within an unambiguous skid region from a detection point in the code coinciding with the detection of the execution event to a preceding operation, wherein the displacement is based, at least in part, on a type of operation appropriate to have triggered the execution event as required by the independent claims 1 and 19. As previously discussed above, Anderson does not teach or suggest a limitation of classifying the execution event as ambiguous or unambiguous as required by independent claim 46.

Further, Bala does not teach or suggest such limitations. Rather, Bala teaches the insertion of NOP instructions in the instruction stream to prevent pipeline hazards from occurring to speed up program execution (see *Bala* page 1, Introduction). That is, Bala is concerned with efficient instruction scheduling to avoid pipeline hazards rather than about backtracking within an unambiguous skid region from a detection point in the code coinciding with the detection of the execution event to a preceding operation (that caused the event).

Also, Bala does not teach or suggest classifying the execution event as ambiguous or unambiguous. Therefore, it is respectfully submitted that claims 63-69 are patentable over Anderson in view of Bala and such indication is respectfully requested.

C. Rejection of Claims 50-54 and 61 Under 35 U.S.C. § 103

Initially, the rejection of independent claims 50 and 61 is addressed. Independent claim 50 includes the limitation "one or more padding operations following a first operation of the execution sequence, the padding operations providing an unambiguous skid region of the execution sequence between the first operation and a subsequent ambiguity creating location to provide a displacement between the ambiguity creating location and the first operation to cover an expected detection latency of the first operation." Claim 61 includes a similar limitation. As such the claims require insertion of padding operations to provide an unambiguous skid region of the execution sequence between a first operation and an ambiguity creating location. This is done to avoid occurrence of an ambiguity creating location when executing a sequence of instructions from the first operation to the instruction that is associated with the detection of an event associated with the first operation (the expected detection latency).

While Bala teaches or suggests the insertion of NOPs to avoid pipeline hazards, this is not related to the problem addressed by independent claims 50 and 61. Bala inserts instructions to avoid hazards that would stall a pipeline and thus slow down program execution. Claims 50 and 61 are concerned with insertion of padding operations to eliminate ambiguity creating locations such as branch target that can create an ambiguity when backtracking to associate an event with an operation that caused the event. That is, independent claims 50 and 61 require padding operations to provide a displacement between the ambiguity location and the first particular operations to cover an expected detection latency of the first operation. It is respectfully submitted that one of ordinary skill in the art would not be motivated to combine the teachings of Ronstrom and Bala to overcome the problem addressed by independent claims 50 and 61.

Because there is no motivation to combine Ronstrom and Bala, it is respectfully submitted that independent claims 50 and 61 are patentable over Ronstrom in view of Bala and such indication is respectfully requested. The remaining claims 51-54 all depend, either directly or indirectly, from independent claim 50. Accordingly, these dependent claims are themselves patentable over Ronstrom in view of Bala for at least the reasons set forth above and such indication is respectfully requested.

IV. Conclusion

The Applicant thanks the Examiner for his thorough review of the application. The Applicant respectfully submits the present application, as amended, is in condition for

allowance and respectfully requests the issuance of a Notice of Allowability as soon as practicable.

This Amendment is submitted contemporaneously with a petition for a two-month extension of time in accordance with 37 C.F.R. § 1.136(a). Accordingly, please charge Deposit Account No. 04-1415 in the amount of \$450.00, for a two-month extension of time fee. The Applicant believes no further fees or petitions are required. However, if any such petitions or fees are necessary, please consider this a request therefor and authorization to charge Deposit Account No. 04-1415 accordingly.

If the Examiner should require any additional information or amendment, please contact the undersigned attorney.

Dated: 25 JAN 2017

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'Gregory P. Durbin', is written over a horizontal line.

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